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A single-step hot stamping-forging process for aluminum alloy shell parts with nonuniform thickness

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Abstract: In this study, a single-step hot stamping-forging process using a counter punch was proposed to produce pan-shaped shell parts with nonuniform thickness distributions, which are often used in satellites. Through FE simulations, the effects of die temperature, counter punch **initial** interposition length and counter force on the part thickness were examined. It was found that the material flow is divided at a flow dividing surface (FDS) which moves in the wall during forming. The maximum bottom thickness and nonuniformity were found to be closely related to the counter force and **initial** interposition length. Base on the simulation results, experiments were carried out using sheet blanks with initial thicknesses of 4 mm. After stamping-forging deformation, the part bottom was successfully thickened to 4.3 mm while the wall was thinned to 2.5~2.7 mm.

Keywords: Hot stamping-forging process

Integrated plastic forming

Aluminum alloy

Sheet metal

Sheet bulk metal forming

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